Name _____

Genetic Code Activity

Background:

DNA, deoxyribonucleic acid, is the genetic secret to all life. Knowledge of its structure and functions is key to an understanding of molecular biology. Understanding the structure of DNA helps to explain many life processes and leads to an understanding of why we are who we are. In this activity, the major processes of DNA will be modeled. Each step of the procedure will simulate a key DNA structure or process.

Your sample DNA sequences will contain 15 to27 base pairs. A real chromosome may contain a single DNA molecule with as many as 10^8 (100 million) base pairs! Since these base pairs represent the genetic code, the chromosomes can store a lot of messages!

DNA serves as the genetic template and storage place for genetic messages. In order for the messages to be processed, RNA (ribonucleic acid) becomes involved. The first step involves the synthesis of messenger RNA (mRNA) from the DNA template by the process of transcription. This mRNA then carries the transcripted message to the ribosomes where proteins are synthesized. In RNA, thymine is replaced by uracil as the base complement to adenine.

The code in the newly synthesized mRNA undergoes the process of translation and is used to produce a specific sequence of amino acids, i.e., a specific protein. This translation process involves another type of RNA, called transfer RNA (tRNA). The tRNA has a three-base section called the anticodon which is the key to linking its specific attached amino acid to the growing chain of amino acids. The order in which the tRNA molecules are used is determined by the codon sequence of the mRNA, which, of course, was originally encoded in the DNA in the nucleus.

Procedure:

1. Take the Genetic Code Worksheet (on the back of this sheet) to the "nucleus" table.
2. Carefully copy (no mutations!) the assigned DNA code onto the Genetic Code worksheet.
3. Return to your seat and write a ***transcribed*** code for mRNA that reflects the DNA code in the appropriate space on your Genetic Code worksheet.
4. Break your mRNA sequence down into codons (3 base pair segments).
5. Next, ***translate*** the mRNA code into tRNA anticodons in the space provided on your Genetic Code worksheet.
6. Go to the "cytoplasm" table and determine the message that is now encoded in the RNA molecules. Write your completely decoded message on the worksheet.
7. Check with me to make sure your genetic decoding work has no mutations.
8. Decode other DNA codes as directed by me.

Name ____

Genetic Code Worksheet

DNA (#) __

mRNA __

mRNA codons _______, _______, _______, _______, _______, _______, _______, _______ ,_______

tRNA anticodons _______, _______, _______, _______, _______, _______, _______, _______ ,_______

Decoded message: ____

DNA (#) __

mRNA __

mRNA codons _______, _______, _______, _______, _______, _______, _______, _______ ,_______

tRNA anticodons _______, _______, _______, _______, _______, _______, _______, _______ ,_______

Decoded message: ____

DNA (#) __

mRNA __

mRNA codons _______, _______, _______, _______, _______, _______, _______, _______ ,_______

tRNA anticodons _______, _______, _______, _______, _______, _______, _______, _______ ,_______

Decoded message: ____

DNA (#) __

mRNA __

mRNA codons _______, _______, _______, _______, _______, _______, _______, _______ ,_______

tRNA anticodons _______, _______, _______, _______, _______, _______, _______, _______ ,_______

Decoded message: ____